CLAIMS

We claim:

1. A method for controlling a process parameter of a control loop comprising:

providing a reference control signal at an input to a control loop;

providing a lead-lag filter in communication with the control signal;

providing a user interface in operable communication with the lead-lag filter, said user interface facilitating remote manipulation of a ratio of lead-to-lag produced by the lead-lag filter; and

operating the user interface to remotely manipulate the ratio of lead-to-lag of the lead-lag filter to produce an alteration in the process parameter to be controlled.

2. The method of claim 1, wherein operating the user interface includes adjusting at least one tuning coefficient associated with the lead-lag filter by manipulating at least one virtual interface control provided on a display associated with the user interface.

3. The method of claim 2, and displaying data associated with the process parameter to be controlled.

4. The method of claim 3, wherein the data is displayed on the display associated with the user interface.

5. The method of claim 1, and manipulating a virtual ratio of lead-to-lag to generate a predicted response of the process parameter to be controlled, and displaying the predicted response on a display associated with the user interface.

6. The method of claim 1, wherein the reference control signal is a 4-20mA control signal.

7. A system for tuning a process parameter of a control loop comprising:

a lead-lag input filter in communication with an input to the control loop;

a controller applying a reference control signal to an input of the lead-lag input filter;

a user interface in operable communication with the lead-lag filter, said user interface including at least one adjustable interface control, wherein adjustment of each of said at least one adjustable interface controls alters at least one tuning coefficient associated with the lead-lag filter.

8. The system of claim 7, wherein the user interface further includes a display for monitoring a process parameter affected by alteration of the at least one tuning coefficient.

9. The system of claim 8, wherein the control loop includes at least one feedback signal that varies with changes in the process parameter.

10. The system of claim 8, wherein the user interface includes a display on which variations in the at least one feedback signal are graphically displayed.

11. The system of claim 7, wherein the user interface further includes a display for a monitoring a predicted response of the process parameter in response to adjustments of each of the at least one adjustable interface controls.

12. The system of claim 11, wherein the user interface is provided with at least one control mechanism to control a latency period between the predicted response of the process parameter to adjustments of each of the at least one adjustable interface controls, and application of the adjustments of each of the at least one adjustable interface controls to the lead-lag filter to effect an actual response of the process parameter.

13. The system of claim 7, wherein said user interface is provided in a location remote from the lead-lag input filter.

14. A system for tuning the response of a control valve comprising:

a control loop including a valve controller, a current-to-pressure transducer, a control valve, and a valve actuator in operable communication with a valve plug of the control valve;

a lead-lag filter in communication with an input to the control loop; and

a process controller supplying a reference control signal to an input of the lead-lag filter.

15. The system of claim 14, further comprising a user interface in operable communication with the lead-lag filter, said user interface including at least one adjustable interface control, wherein adjustment of each of said at least one adjustable interface controls alters at least one tuning coefficient associated with the lead-lag filter.

16. The system of claim 15, wherein the user interface is located at a remote location from the lead-lag filter.

17. The system of claim 15, wherein the user interface communicates with the lead-lag filter through at least one of a group of telephone lines, satellite transmission, coaxial cable, Ethernet, fiber optic cable, and the Internet.

18. The system of claim 15, wherein the user interface further includes a display for a monitoring a predicted response of a position of the valve plug of the control valve in response to adjustments of each of the at least one adjustable interface controls.

19. The system of claim 18, wherein the user interface is provided with at least one control mechanism to control a latency period between the predicted response of the position

of the valve plug of the control valve to adjustments of each of the at least one adjustable interface controls, and application of the adjustments of each of the at least one adjustable interface controls to the lead-lag filter to effect an actual response of the position of the valve plug of the control valve.

20. The system of claim 14, wherein the lead-lag input filter is in communication with a controller, said controller including programming adapted to cause the lead-lag input filter to curtail movement of a valve stem of the control valve operatively coupled to the valve plug as the valve plug approaches at least one of a valve seat and a travel stop of the control valve.

21. A system for tuning the position of a valve plug of a control valve within a control valve servo control loop, comprising:

a control valve servo control loop including

an input,

a first summer in communication with the input,

an amplifier in communication with the first summer,

a second summer in communication with the amplifier,

a control valve actuation stage in communication with the amplifier, the control valve actuation stage comprising at least a current-to-pressure transducer and a pneumatic relay in communication with the current-to-pressure transducer, the control valve actuation stage further including at least one of a group of a quick exhaust valve and a volume booster in pneumatic communication with the current-to-pressure transducer, and

an actuator in communication with the control valve actuation stage and being operatively coupled to the control valve,

the control valve having a valve stem operatively coupled to the valve plug,

a lead-lag filter connected to the input of the process control loop; and

a reference control signal applied to an input of the lead-lag input filter,

the lead-lag filter selectively modifying the reference control signal to provide a filtered output of the lead-lag input filter.

22. The system of claim 21, wherein the filtered output of the lead-lag input filter is supplied to the first summer, the first summer comparing a value corresponding to a position of the valve stem with a value corresponding to the filtered output of the lead-lag input filter and generating an error signal which is provided to the amplifier.

23. The system of claim 22, wherein the control valve servo control loop further includes a first gain unit and a second gain unit, and wherein the amplifier applies a gain to the second summer, and the second summer compares a velocity feedback gain developed by the first gain unit and a minor loop feedback gain developed by the second gain unit to the gain applied by the amplifier, and said second summer provides a value corresponding to the comparison performed by the second summer to the current-to-pressure transducer.

24. The system of claim 23, wherein the current-to-pressure transducer provides a pneumatic signal to the pneumatic relay.

25. The system of claim 24, wherein the pneumatic relay provides a pneumatic output to the at least one volume booster or quick exhaust valve and to the actuator.

26. The system of claim 21, wherein a signal corresponding to a position of the valve stem is communicated to the first summer.

27. The system of claim 21, further comprising a user interface in operable communication with the lead-lag filter, said user interface including at least one adjustable

interface control, wherein adjustment of each of said at least one adjustable interface controls alters at least one tuning coefficient associated with the lead-lag filter.

28. The system of claim 27, wherein the user interface is located at a remote location from the lead-lag filter.

29. The system of claim 27, wherein the user interface communicates with the lead-lag filter through at least one of a group of telephone lines, satellite transmission, coaxial cable, Ethernet, fiber optic cable, and the Internet.

30. The system of claim 27, wherein the user interface further includes a display for a monitoring a predicted response of a position of the valve stem of the control valve in response to adjustments of each of the at least one adjustable interface controls.

31.. The system of claim 30, wherein the user interface is provided with at least one control mechanism to control a latency period between the predicted response of the position of the valve stem of the control valve to adjustments of each of the at least one adjustable interface controls, and application of the adjustments of each of the at least one adjustable interface controls to the lead-lag filter to effect an actual response of the position of the valve stem of the control valve.

32. The system of claim 21, wherein the lead-lag input filter is in communication with a controller, said controller including programming adapted to cause the lead-lag input filter to curtail movement of the valve stem as a valve plug associated with the valve stem approaches at least one of a valve seat and a travel stop of the control valve.

33. The system of claim 21, wherein the lead-lag input filter is in communication with both a controller, said controller including programming adapted to cause predetermined

modifications to the reference control signal, and a user interface in operable communication with the lead-lag filter, said user interface including at least one adjustable interface control, wherein adjustment of each of said at least one adjustable interface controls alters at least one tuning coefficient associated with the lead-lag filter to cause modifications to the reference control signal.

34. The system of claim 33, and wherein the user interface is further provided with a control mechanism operable to select between the controller and the user interface as a stimulus for causing modifications to the reference control signal by the lead-lag filter.

35. A method for optimally tuning adjustment of a parameter of a control loop comprising:

providing a lead-lag input filter in communication with an input of a control loop;

supplying a reference control signal to an input of the lead-lag input filter;

providing at least one of a user interface and a controller in operable communication with the lead-lag input filter; and

operating the user interface or controller to signal the lead-lag input filter to modify the reference control signal prior to application of the control signal to the input of the control loop.

36. The method of claim 35, and providing both the user interface and the controller in operable communication with the lead-lag input filter, and selecting among the user interface and the controller.

37. The method of claim 36, wherein upon selecting the controller, at least partially disabling the user interface.

38. A system for implementing adjustments to a process parameter of a logical process comprising:

a logical process having at least one adjustable parameter therein;

a lead-lag input filter in communication with the logical process;

a user interface in operable communication with the lead-lag input filter, the user interface in communication with a processor, a display, an input device, and a routine adapted to display a graphical representation of at least one adjustable control on the display, the routine further adapted to display an alteration in the graphical representation of the at least one adjustable control in response to a manipulation of the input device and the processor is adapted to signal a change in output of the lead-lag input filter corresponding to the manipulation of the input device, and wherein the change in output of the lead-lag filter alters the at least one adjustable process parameter within the logical process.

39. The system of claim 38, wherein the logical process includes at least one sensor for detecting a characteristic of the at least one process parameter, and the routine is further adapted to display a graphical representation of the detected characteristic of the process parameter and a graphical representation of an effect of alteration of the at least one adjustable process parameter on the detected characteristic.

40. The system of claim 39, wherein the routine is further adapted to delay the signaling of the change in output of the lead-lag input filter corresponding to the manipulation of the input device.

41. The system of claim 39, wherein the routine is further adapted to display, in response to manipulation of the input device, a graphical representation of a predicted effect of alteration of the at least one adjustable process parameter on the detected characteristic prior

to the signaling of the change in output of the lead-lag input filter corresponding to the manipulation of the input device.

42. The system of claim 38, wherein the logical process is a control loop including a control valve having a valve plug and the adjustable process parameter is a location of the valve plug.